The relationship between experiential deficits of negative symptoms and subjective quality of life in schizophrenia.

Savill M.[1] Researcher
Orfanos S.[1] Researcher
Reininghaus, U.[2,3] Lecturer
Wykes T.[2] Professor of Clinical Psychology and Rehabilitation
Bentall R.[4] Professor of Clinical Psychology
Priebe S.*[1] Professor of Social and Community Psychiatry

[1]Unit for Social and Community Psychiatry. WHO Collaborative Centre for Mental Health Services Development, Queen Mary University of London, London. E13 8SP.
[2]Institute of Psychiatry, Kings College London, De Crespigny Park, London, SE5 8AF.
[3]Department of Psychiatry and Psychology, School for Mental Health and Neuroscience, Maastricht University, The Netherlands.
[4]Department of Psychiatry, University of Liverpool, Waterhouse Building, 1-5 Brownlow Street, Liverpool, L69 3GL.

*Denotes corresponding author.
Phone number: +44 207 540 4210
Fax number: +44 207 540 2976 (extn: 2342)
Email address: s.priebe:qmul.ac.uk

Word count: abstract: 244, main body: 2,723.

Key words: Expressive deficits, wellbeing, life satisfaction, CAINS.

Abstract

Understanding the link between quality of life and symptoms in schizophrenia is important in enhancing the prospect of patient recovery. Only weak associations have been found between subjective quality of life (SQOL) and negative symptoms. However, this may be because many existing symptom assessment scales inadequately assess the experiential deficits of negative symptoms. This study aimed to re-evaluate these findings using the Clinical Assessment Interview for Negative Symptoms (CAINS), which as been designed to capture both the expressive and experiential subdomains of negative symptoms as separate constructs**.** In this observational study 275 participants with at least moderate negative symptoms were assessed three times over nine months using the CAINS, the Positive and Negative Syndrome Scale (PANSS), and the Manchester Short Assessment of Quality of Life (MANSA). A significant negative association between SQOL and the CAINS experiential subscale was found in the cross-sectional analysis (adj. B= -0.28, 95% CI= -0.44 to -0.12, P=.001), and in the change scores (adj. B=-0.13, 95% CI=-0.26 to -0.01, P=.032). No associations between SQOL and expressive symptoms, or negative symptoms measured using the PANSS were detected in the multivariable models. These findings suggest that the association between negative symptoms and SQOL is related primarily to experiential deficits, and highlights the importance of measuring the separate subdomains of negative symptoms as distinct constructs. The findings also highlight the impact of negative symptoms and experiential deficits in particular on social outcomes, further emphasising the need to develop new treatments for these symptoms.

1. Introduction:

For decades there has been a consensus that improving symptoms alone is not a sufficient treatment outcome in schizophrenia, with improvements in quality of life seen as central to the concept of recovery (Liberman et al., 2002; Priebe, 2007). Lower quality of life has consistently been associated with higher negative symptoms of schizophrenia, rather than positive symptoms (Ho et al., 1998), however the relationship appears complex.

Quality of life is recognised to comprise of objective components such as daily life functioning and external resources, and subjective components such as wellbeing and satisfaction with life (Katschnig, 2000; Lehman et al., 1982; Priebe, 2007). While there evidence of a strong association between negative symptoms and objective quality of life (OQOL) (Ho et al., 1998; Hunter and Barry, 2012; Milev et al., 2005; Whitty et al., 2008), only a weak association between negative symptoms and subjective quality of life (SQOL) has previously been found (Eack and Newhill, 2007; Fitzgerald et al., 2001; Narvaez et al., 2008; Priebe et al., 2011). This may be because SQOL is determined by multiple processes, including the comparison between expectations and aspirations, a comparison with others, and adaptation over time, all of which may result in a less negative appraisal by individuals with chronic schizophrenia (Priebe, 2007). However, it may also be because the relationship has been under-reported due to how negative symptoms have been assessed.

Negative symptoms include expressive deficits such as blunted affect and alogia, and experiential deficits such as asociality, anhedonia and amotivation. There is evidence to to suggest that older scales are associated more with expressive deficits (Horan et al., 2011), which may be attributable to the fact that such tools rely largely on behavioural referents to measure different negative symptoms (Blanchard et al., 2011). One advantage of the newly developed CAINS is that experiential and expressive symptoms are separated into distinct subdomains, with a focus on subjective experiences of negative symptoms in addition to observed and reported behaviours.

With this in mind, this study aimed to re-evaluate the link between negative symptoms and SQOL using data from one of the largest trials to use the CAINS to date (Priebe et al., 2013). We tested the hypothesis that the association between negative symptoms and SQOL will relate exclusvely to experiential deficits, both cross sectionally and over time. We hypothesised that this relationship would remain after controlling for depressive symptoms, which is important given the association between low mood and SQOL (Eack and Newhill, 2007; Priebe et al., 2011). With evidence to suggest that the relationship between SQOL and symptoms may be different between men and women (Röder-Wanner and Priebe, 1998), and between those with a long and short illness duration (Priebe et al., 2000), a comparison between these groups was also considered.

2. Method

2.1. Design

This is a secondary analysis of data from the NESS Study (ICTRN842165587); a randomised controlled trial evaluating the effectiveness of body psychotherapy for schizophrenia. In the study participants were randomised to receive either a 20 session Pilates class or body psychotherapy group.

Assessments were conducted at three timepoints; baseline, end of treatment approximately 3 months later, and then six months after treatment end. At each stage the CAINS (Horan et al., 2011), PANSS (Kay et al., 1987), Manchester Short Assessment of Quality of Life scale (MANSA) (Priebe et al., 1999), and Calgary depression scale (Addington et al., 1993) were completed.

2.2.Sample:

Participants were outpatients with schizophrenia (F20.0-F20.9), presenting with at a score of at least 18 on the PANSS negative subscale. Further details of the study are described elsewhere (Priebe et al., 2013)

2.3. Assessment tools:

The CAINS (Horan et al., 2011) is a scale designed to address the limitations inherent to previous assessment tools used to measure negative symptoms (Blanchard et al., 2011). Although the scale can provide a single summary score, the authors recommend reporting the emotional experience and emotional expression subscales seperately given the evidence that they are measuring distinct constructs (Kring et al., 2013). The scale comprises of 13 items, rated from 0 (no impairment) to 4 (severe impairment). The first nine items relate to experential deficits, assessing the motivation, anticipation and experience of pleasure in occupational and recreational actvities, and social contacts with partners, friends and family. The last four items relate to expressive deficits, assessing both vocal and gestural features. Evaluations of the tool suggest excellent divergent and convergent validity (Kring et al., 2013).

The PANSS (Kay et al., 1987) is a 30-item semi-structured interview designed to provide an overall measure of the symptoms of schizophrenia. Sixteen of the items measure general psychopathology, seven positive symptoms of schizophrenia such as hallucinations and delusions, and seven negative symptoms. Each item is rated from 1-7, resulting in a range of 7-49 for positive and negative symptoms, and 16-112 for general symptoms. In this study the Marder factor solution of the PANSS negative subscale was adopted (Marder et al., 1997) which exludes the abstract thinking and stereotypical thinking items given they are understood to relate to cognitive deficits (Bryson et al., 1999). Instead, the active social withdrawal and motor retardation items are included.

Subjective quality of life was measured by the MANSA (Priebe et al., 1999). The questionnaire consists of 16 items; 12 subjective and four objective. The 12 subjective items cover self-rated satisfaction of employment, finances, recreational activities, friendships, safety, housing, health, sex-life, family and overall life satisfaction; scores range from 1 (couldn't be worse) to 7 (couldn't be better). The four objective items are rated as yes or no, and cover whether they have been a victim of a crime, been accused of crime, have anyone they consider a close friend, or have seen a friend in the past seven days. A mean total of the 12 subjective items were calculated to create a summary score.

Depressive symptoms were assessed using the Calgary depression scale (Addington et al., 1993), which a scale designed specifically for schizophrenia populations. The questionnaire comprises of nine items, rated from 0-2, with a higher score indicating higher depressive symptoms.

2.4. Analysis:

In stage 1 the association between SQOL and expressive deficits, experiential deficits, depression, and a summary of the overall negative symptom construct was examined in a univariable regression analysis. Any predictors approaching significance ($p<.10$) were included in a multivariable regression model. This analysis was replicated using the three month and nine month follow up data. To assess whether there were any differences in the relationship between negative symptoms and SQOL between men and women, an interaction term between gender and any significant negative symptom variable was added to the multivariable model. To determine whether the relationship is different in participants with a long and short duration of illness, a median split of the sample by length of illness was performed. An interaction effect between illness duration and any significant negative symptom score was then added to the multivariable model.

In stage 2, longitudinal modelling was used to explore the association between the change in negative symptoms and SQOL over time. Symptom change scores were calculated by subtracting i) nine month follow up scores (T3) from the three month follow up scores (T2), and ii) three month follow up scores (T2) from the baseline scores (T1), resulting in two panels of change-score data. The associations between the change scores in SQOL and different measures of negative symptoms were then evaluated by way of multi-level modelling, with each change score nested within participants, included as a random effect. Significant univariate associations were then analysed in a multivariable model, including the change scores of the Calgary scale to control for the association between depression and SQOL. Finally, an interaction effect between therapy group allocation and negative symptom change was added to the multivariable model where any type of negative symptom change was found to be significantly associated to SQOL change. Analyses were conducted using STATA version 11.0 (StataCorp, 2009).

3. Results:

Participants were mostly men (73.8%), with a mean age of 42.2 years (SD=10.65) and a long history of illness (mean=13.6 years, SD=9.1). At baseline participants reported low depressive symptoms (Calgary mean=4.70, SD=4.37), and moderate negative symptoms (PANSS Marder negative mean=22.1, SD=4.8). A total of 275 participants completed the baseline assessment, and 255 the final assessment, resulting in a rentention rate of 92.7%. No significant differences were detected between completers and drop-outs in the MANSA, CAINS, or PANSS Marder subcales at baseline. The inter-rater reliability between the assessors in the CAINS and PANSS was high (PANSS ICC=.85; CAINS total ICC=.80).

Mean values of the CAINS subscales, the PANSS Marder negative subscale and the MANSA are presented in Table 1. A small, significant reduction over time was detected in the CAINS expression

subscales, and the PANSS Marder negative subscale. A slight improvement in SQOL over time was also detected, however this was not significant.

[INSERT TABLE 1 HERE]

The associations between negative symptoms and SQOL are reported in Table 2. At baseline a significant negative association was found between SQOL and the CAINS experiental subscale, explaining 8.3% of the variance (B=-0.43, 95% CI=-0.62—-0.25, P<.001. R^2=.083). No association was detected between the SQOL and the PANSS Marder negative subscale (B=-.01, 95% CI=-0.34—0.01, P=.356. R^2=.003) or the CAINS expression subscale (B=-0.10, 95% CI=-0.02—0.20, P=.103. R^2=.010). A strong significant negative association between depressive symptoms and SQOL was detected, explaining 24.1% of the variance (B=-.38, 95% CI= -0.46—-0.30, P<.001, R^2=.241).

In the multivariable analyses, a significant negative association was detected between experiential symptoms and SQOL, after controlling for depressive symptoms (adj. B= -0.28, 95% CI -0.44—-0.12, P=.001). The negative associations between experiential deficits and SQOL were consistent both at three months (adj. B=-0.19, 95% CI=-0.36—-0.02, P=.036) and nine months follow-up (adj. B=-0.23, 95% CI=-0.37—-0.08, P=.003). The relationship between experiential symptoms and SQOL was not significantly different between participants with a short and long illness duration (adj. B= -0.08, 95% CI= -0.43—-0.27, P=.671), or between men and women (adj. B=0.29, 95% CI -0.11—-0.68, P=.152).

[INSERT TABLE 2 HERE]

Over time, a negative association was detected between SQOL and experiential symptoms (B=-0.21, 95% CI= -0.34—-0.09, P=.001), depressive symptoms (B=-0.04, 95% CI= -0.05—-0.02, P<.001), and the PANSS Marder negative subscale (B=-0.02, 95% CI= -0.03—0.00, P=.044). No significant association was detected between the changes in expressive symptoms and SQOL. In the multivariate analysis, a significant negative association between depressive symptoms (adj. B=-0.03, 95% CI= -0.05—-0.01, P=.014), and experiential symptoms (adj. B=-0.19, 95% CI= -0.31—-0.04, P=.008) was detected. The relationship between the PANSS Marder negative subscale and SQOL was no longer significant (adj. B=0.00, 95% CI= -0.02—0.02, P=.882).

In the sensitivity analysis an interaction effect between change in experiential symptoms and therapy group allocation was added to the multivariable model. While there was a trend toward the relationship being stronger in the Pilates rather than body psychotherapy condition, this was not significant (adj. B= 0.21, 95% CI=-0.04—0.46, P=.100).

4. Discussion:

4.1. Main findings:

The findings indicate that the relationship between SQOL and negative symptoms relate exclusively to experiential deficits. A significant negative association was detected between SQOL and the CAINS experiential subscale at all three time points assessed. Over time, again only the experiential features of negative symptoms were found to be a significant predictor of SQOL change. No relationship was found between either SQOL and the CAINS expressive subscale, or the PANSS

negative subscale in the multivariable model. These findings suggest that some scales under-report the relationship between SQOL and negative symptoms, either by inadequately assessing experiential symptoms or examining negative symptoms as a singular construct.

4.2. Strengths and weaknesses:

The data came from a large trial with excellent study retention rates. This dataset is one of the largest to use the new CAINS assessment tool to date, with a sufficient number of participants to interpret non-significant associations as evidence of no effect. The inter-rater reliability between the assessors on both the PANSS and the CAINS was high. In the sensitivity analyses the findings were the same at all three time points, consistent between men and women, those that reported a long and short duration of illness, and between the therapy intervention groups, suggesting the findings are robust. The association between experiential symptoms and SQOL was found to be consistent in the multivariable analysis which controlled for depressive symptoms, indicating that the relationship detected is not attributable to low mood. The fact that significant associations were only detected between experiential symptoms and SQOL, and not expressive symptoms or negative symptoms as measured as a singular construct suggests that the relationship detected was not a consequence of common method variance.

The main limitation of the study relates to a possible selection bias. All participants reported at least moderate levels of negative symptoms at baseline, so it is unclear whether these findings would be replicated in participants with lower negative symptoms. In addition, most participants reported a long duration of illness, which may be an issue given the impact of symptoms on SQOL is more prominent in the early stages of illness (Browne et al., 2000). In this study no significant difference was detected between participants with a long and short illness duration. However, 90% of participants reported an illness duration of at least 4 years, so it is unclear whether these relationships would be consistent in recent onset patients.

4.3. Comparison with the literature:

While the relationship between negative symptoms of schizophrenia and SQOL has been examined previously, to our knowledge this is the first time the link between SQOL and expressive and experiential deficits as separate constructs have been considered. The association between experiential deficits and SQOL appears to be significantly stronger than in previous studies which have examined the relationship to negative symptoms as a singular construct (Eack and Newhill, 2007; Narvaez et al., 2008; Priebe et al., 2011). In contrast to previous studies, the association between changes in experiential deficits and SQOL over time remained significant after controlling for depression (Priebe et al., 2011).

The reason why experiential symptoms in particular are associated with lower SQOL merits further investigation. Regarding anhedonia, people with schizophrenia report impairments in anticipatory and trait assessments of pleasure (Gard et al., 2007; Horan et al., 2006), which may impact how an individual reports their life satisfaction. Hedonic deficits are also significantly associated with health-related quality of life (Ritsner et al., 2011). With amotivation, evidence suggests that motivational

deficits may be an important determinant of functional disability (Konstantakopoulos et al., 2011; Reddy et al., 2015), possibly attributable to difficulties in perceiving reward outcomes (Gard et al., 2014), and effort-based decision making (Horan et al., 2015). This argument is supported by the recent finding that amotivation, but not expressive deficits, have been found to be associated with impairments in integrating rewards with effortful behaviour during decision making (Hartmann et al., 2015). Asociality is likely to result in a larger degree of isolation from others, and impair their ability to adequately function in their social context. Taken together, these symptoms could all effect SQOL directly in a way that expressive deficits may not.

These findings support the argument that experiential and expressive symptoms represent distinct subdomains (Blanchard and Cohen, 2006), and as such should be measured separately (Horan et al., 2011). Assessing the symptoms in this manner may better resemble the negative symptom construct as it is currently understood, and may yield new insights which have previously been undetected.

This study lends support to a model proposed by Priebe (Priebe, 2007), which suggests that QOL could be improved by treatment indirectly via improvements in symptoms. As noted by Reddy (Reddy et al., 2015), there has been a recent focus on developing new treatments designed specifically to target experiential symptoms, given their impact on functional disability. The findings of the current study suggest that such a focus may also be important to improving the SQOL of patients with schizophrenia.

4.4. Conclusion:

The link between SQOL and negative symptoms appears to relate exclusively to experiential deficits. These findings highlight the importance of assessing the experiential and expressive subdomains of negative symptoms as separate constructs, and support the model which proposes that an improvement in symptoms can indirectly result in improvements in SQOL. The findings also highlight the importance of treating negative symptoms, and experiential deficits in particular, given their impact of social outcomes. Interventions designed specifically to improve experiential deficits should be the focus of both treatment and research if the aim is to improve SQOL as part of a wider programme to support patient recovery.

Table 1: Mean scores and change over time.

Variable	T1		T2		T3		F	P
	Mean	SD	Mean	SD	Mean	SD		
MANSA SQOL	4.44	0.93	4.58	0.89	4.52	0.95	1.51	.221
PANSS Negative (Marder)	22.07	4.83	20.51	5.43	20.13	5.61	10.07	<.001
CAINS Expression	1.94	0.92	1.85	0.98	1.78	1.04	1.76	.174
CAINS Experience	2.42	0.62	2.24	0.64	2.29	0.71	4.92	.008
Calgary Depression scale	4.69	4.36	3.92	4.30	4.11	4.15	2.37	.094

SD= standard deviation; SQOL subjective quality of life; T1= baseline; T2= 3 months follow up; T3= 9 months follow up

Table 2: Associations between negative symptoms, depression and SQOL

	Univariate model					Multivariate model				
	B	SE B	95% CI		P	R^2	Adj. B	SE B	95% CI		P
Cross-sectional associations with SQOL at baseline											
CAINS Experiential subscale	-0.43	0.09	-0.62	-0.25	<.001	.083	-0.28	0.08	-0.44	-0.12	.001
CAINS Expressive subscale	0.10	0.06	-0.02	0.22	.103	.010	-				
PANSS Negative subscale	-0.01	0.01	-0.03	0.01	.356	.003	-				
Calgary Depression Scale	-0.38	0.04	-0.46	-0.30	<.001	.241	-0.35	0.04	-0.43	-0.27	<.001
Associations between changes over time with SQOL											
CAINS Experiential subscale	-0.21	0.06	-0.34	-0.09	.001		-0.18	0.07	-0.31	-0.04	.008
CAINS Expressive subscale	-0.05	0.05	-0.15	0.05	.352		-				
PANSS Negative subscale	-0.02	0.01	-0.03	-0.00	.044		0.00	0.01	-0.02	0.02	.882
Calgary Depression Scale	-0.04	0.01	-0.05	-0.02	<.001		-0.03	0.01	-0.05	-0.01	.014

SQOL= Subjective Quality of life; B= Beta coefficient; SE= Standard error; CI confidence interval

References:

Addington, D., Addington, J., Maticka-Tyndale, E., 1993. Assessing depression in schizophrenia: the Calgary Depression Scale. Brit. J. Psychiat. 22, 39–44.

Blanchard, J.J., Cohen, A.S., 2006. The structure of negative symptoms within schizophrenia: implications for assessment. Schizophrenia Bull. 32 (2), 238–245.

Blanchard, J.J., Kring, A.M., Horan, W.P., Gur, R., 2011. Toward the next generation of negative symptom assessments: the collaboration to advance negative symptom assessment in schizophrenia. Schizophrenia Bull. 37 (2), 291–299.

Browne, S., Clarke, M., Gervin, M., Waddington, J.L., Larkin, C., O'Callaghan, E., 2000. Determinants of quality of life at first presentation with schizophrenia. Brit. J. Psychiat. 176 (2), 173–176.

Bryson, G., Bell, M., Greig, T., Kaplan, E., 1999. Internal consistency, temporal stability and neuropsychological correlates of three cognitive components of the Positive and Negative Syndrome Scale (PANSS). Schizophr. Res. 38 (1), 27–35.

Eack, S.M., Newhill, C.E., 2007. Psychiatric symptoms and quality of life in schizophrenia: a meta-analysis. Schizophrenia Bull. 33 (5), 1225–1237.

Fitzgerald, P.B., Williams, C., Corteling, N., Filia, S., Brewer, K., Adams, A., De Castella, A., Rolfe, T., Davey, P., Kulkarni, J., 2001. Subject and observer-rated quality of life in schizophrenia. Acta Psychiat. Scand. 103 (5), 387–392.

Gard, D.E., Kring, A.M., Gard, M.G., Horan, W.P., Green, M.F., 2007. Anhedonia in schizophrenia: distinctions between anticipatory and consummatory pleasure. Schizophr. Res. 93 (1), 253–260.

Gard, D.E., Sanchez, A.H., Cooper, K., Fisher, M., Garrett, C., Vinogradov, S., 2014. Do People With Schizophrenia Have Difficulty Anticipating Pleasure, Engaging in Effortful Behavior, or Both? J. Abnorm. Psychol. 123 (4), 771–782.

Hartmann, M.N., Hager, O.M., Reimann, A.V., Chumbley, J.R., Kirschner, M., Seifritz, E., Tobler, P.N., Kaiser, S., 2015. Apathy but not diminished expression in schizophrenia is associated with discounting of monetary rewards by physical effort. Schizophrenia Bull. 41 (2), 503–512.

Ho, B.-C., Nopoulos, P., Flaum, M., Arndt, S., Andreasen, N.C., 1998. Two-year outcome in first-episode schizophrenia: predictive value of symptoms for quality of life. Am. J. Psychiat. 155 (9), 1196–1201.

Horan, W.P., Green, M.F., Kring, A.M., Nuechterlein, K.H., 2006. Does anhedonia in schizophrenia reflect faulty memory for subjectively experienced emotions? J. Abnorm. Psychol. 115 (3), 496–508.

Horan, W.P., Kring, A.M., Gur, R.E., Reise, S.P., Blanchard, J.J., 2011. Development and psychometric validation of the Clinical Assessment Interview for Negative Symptoms (CAINS). Schizophr. Res. 132, 140–145.

Horan, W.P., Reddy, L.F., Barch, D.M., Buchanan, R.W., Dunayevich, E., Gold, J.M., Marder, S.R., Wynn, J.K., Young, J.W., Green, M.F., 2015. Effort-Based Decision-Making Paradigms for Clinical Trials in Schizophrenia: Part 2—External Validity and Correlates. Schizophrenia Bull. 41 (5), 1055–1065.

Hunter, R., Barry, S., 2012. Negative symptoms and psychosocial functioning in schizophrenia: neglected but important targets for treatment. Eur. Psychiat. 27 (6), 432–436.

Katschnig, H., 2000. Schizophrenia and quality of life. Acta Psychiatr. Scand. 102 (Suppl.), 33–37.

Kay, S.R., Flszbein, A., Opfer, L.A., 1987. The positive and negative syndrome scale (PANSS) for schizophrenia. Schizophrenia Bull. 13 (2), 261–276.

Konstantakopoulos, G., Ploumpidis, D., Oulis, P., Patrikelis, P., Soumani, A., Papadimitriou, G.N., Politis, A.M., 2011. Apathy, cognitive deficits and functional impairment in schizophrenia. Schizophr. Res. 133 (1), 193–198.

Kring, A.M., Gur, R.E., Blanchard, J.J., Horan, W.P., Reise, S.P., 2013. The clinical assessment interview for negative symptoms (CAINS): final development and validation. Am. J. Psychiat. 170 (2), 165–172.

Lehman, A.F., Ward, N.C., Linn, L.S., 1982. Chronic mental patients: the quality of life issue. Am. J. Psychiat. 139, 1271–1276.

Liberman, R.P., Kopelowicz, A., Ventura, J., Gutkind, D., 2002. Operational criteria and factors related to recovery from schizophrenia. Int. Rev. Psychiatr. 14 (4), 256–272.

Marder, S.R., Davis, J.M., Chouinard, G., 1997. The effects of risperidone on the five dimensions of schizophrenia derived by factor analysis: combined results of the North American trials. J. Clin. Psychiat. 58 (12), 538–546.

Milev, P., Ho, B.-C., Arndt, S., Andreasen, N.C., 2005. Predictive values of neurocognition and negative symptoms on functional outcome in schizophrenia: a longitudinal first-episode study with 7-year follow-up. Am. J. Psychiat. 162 (3), 495–506.

Narvaez, J.M., Twamley, E.W., McKibbin, C.L., Heaton, R.K., Patterson, T.L., 2008. Subjective and objective quality of life in schizophrenia. Schizophr. Res. 98 (1), 201–208.

Priebe, S., 2007. Social outcomes in schizophrenia. Br. J. Psychiat. 50 (Suppl.), 15–20.

Priebe, S., Huxley, P., Knight, S., Evans, S., 1999. Application and results of the Manchester Short Assessment of Quality of Life (MANSA). Int. J. Soc. Psychiatr. 45 (1), 7–12.

Priebe, S., McCabe, R., Junghan, U., Kallert, T., Ruggeri, M., Slade, M., Reininghaus, U., 2011. Association between symptoms and quality of life in patients with schizophrenia: a pooled analysis of changes over time. Schizophr. Res. 133 (1), 17–21.

Priebe, S., Roeder-Wanner, U.-U., Kaiser, W., 2000. Quality of life in first-admitted schizophrenia patients: a follow-up study. Psychol. Med. 30 (1), 225–230.

Priebe, S., Savill, M., Reininghaus, U., Wykes, T., Bentall, R., Lauber, C., McCrone, P., Röhricht, F., Eldridge, S., 2013. Effectiveness and cost-effectiveness of body psychotherapy in the treatment of negative symptoms of schizophrenia - A multi-centre randomised controlled trial. BMC Psychiatry 13, 26.

Reddy, L.F., Horan, W.P., Green, M.F., 2015. Motivational Deficits and Negative Symptoms in Schizophrenia: Concepts and Assessments. Curr. Topics Behav. Neurosci. 1–17.

Ritsner, M.S., Arbitman, M., Lisker, A., 2011. Anhedonia is an important factor of health-related quality-of-life deficit in schizophrenia and schizoaffective disorder. J. Nerv. Ment. Dis. 199 (11), 845-853.

Röder-Wanner, U.-U., Priebe, S., 1998. Objective and subjective quality of life of first-admitted women and men with schizophrenia. Eur. Arch. Psy. Clin. N. 248 (5), 250–258.

StataCorp, L., 2009. Stata: Release 11. StataCorp LP.

Whitty, P., Clarke, M., McTigue, O., Browne, S., Kamali, M., Kinsella, A., Larkin, C., O'Callaghan, E.G., 2008. Predictors of outcome in first-episode schizophrenia over the first 4 years of illness. Psychol. Med. 38 (8), 1141–1146.

Role of funding source

The data was collected as part of the NESS study, a trial funded by a grant from the National Institute for Health Research-Health Technology Assessment programme (REF: 08/116/68). The funding source had no role in study design, analysis, interpretation or manuscript submission.

Contributors

Mark Savill was responsible for study design and implementation, data analysis, and prepared the original manuscript. Stefan Priebe provided oversight on all aspects of the study, was the chief investigator of the original study from which the data was obtained, and assisted in preparation of the manuscript. Stavros Orfanos was involved in data collection on the original study, and assisted in study design and manuscript preparation. Ulrich Reininghaus was involved in study design, and production of the manuscript. Til Wykes and Richard Bentall were principle investigators on the original study and assisted in the production of the final manuscript.

Conflict of interest

None.

Acknowledgement

The authors would like to thank Ciara Banks, Erica Eassom, Josie Davies, Rebecca Stockley and Tabitha Dow for the role in the data collection, in addition to all participants that agreed to take part.